Project Introduction

As the air transportation system becomes more autonomous in the coming years, there will be an increasing need for monitoring capabilities that operate in the background to identify anomalous behaviors indicating safety or efficiency deficiencies. Today, these behaviors are largely detected after an incident has occurred. In July 2013, an Asiana Boeing 777 flew too low approaching San Francisco International Airport (SFO), its tail hitting a seawall and crashing into the runway. Three people died and 180 were injured. This type of anomalous behavior (i.e. foreign pilots consistently flying too low into SFO on visual approach) could have been detected prior to the crash because the data was available, but no one was looking at it. Metron proposes to develop a semi-autonomous background monitoring system to apply this type of data mining and data discovery to flight track data in order to identify opportunities for improvements to safety and efficiency in airspace operations. In the Phase I effort, Metron demonstrated a proof-of-concept statistical approach that we call the Normalcy Score Broker (NSB), which uses historical flight data to develop models of normal behavior, and then applies statistical methods to combine multiple features into a single score for identifying outliers. Metron has used this same NSB technique to develop operational systems for customers in the land and maritime domains. In the Phase II, we propose to extend the techniques to process at scale, whether for real-time streaming data or for efficient analyses on forensic repositories. In addition to generating new features associated with clusters of flights interacting with each other, we propose to incorporate greater context (e.g., flight behavior in the presence of convective weather) and learning techniques to reduce false positives based on operator feedback on the relevance of the reported anomalies. We will test and evaluate our software on the NASA Cloud-based SMART-NAS Test Bed.

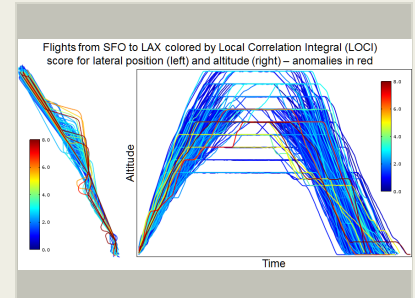Anomaly Detection to Improve Airspace Safety and Efficiency, Phase II
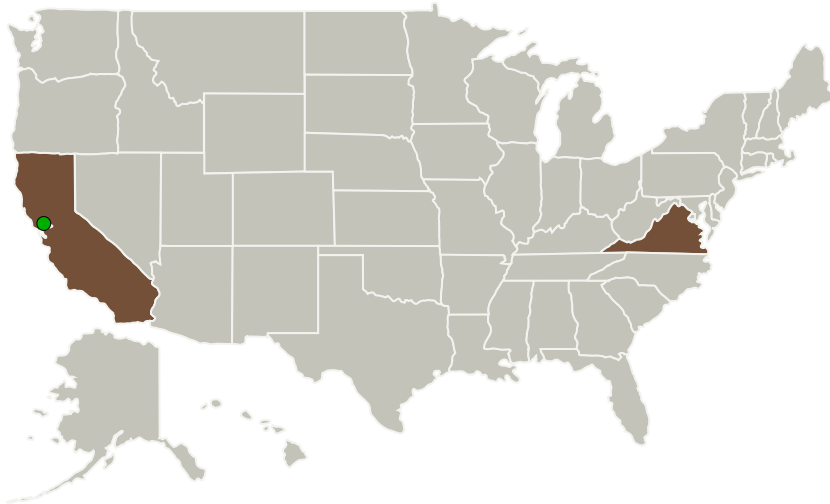
Table of Contents

Anomaly Detection to Improve Airspace Safety and Efficiency, Phase II

Completed Technology Project (2016 - 2018)

Primary U.S. Work Locations and Key Partners

Organizations Performing Work	Role	Type	Location
Metron, Inc	Lead Organization	Industry	Reston, Virginia
●Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations	
California	Virginia

Project Transitions

▶ **May 2016:** Project Start

✓ **May 2018:** Closed out

Closeout Documentation:
- Final Summary Chart(*https://techport.nasa.gov/file/139545*)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Metron, Inc

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

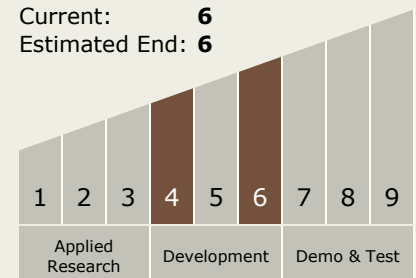Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Gregory A Godfrey

Technology Maturity (TRL)
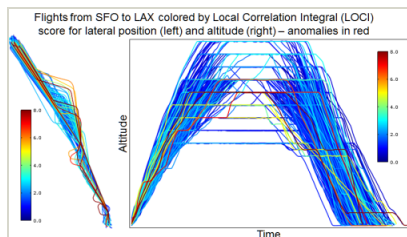
Start: **4**
Current: **6**
Estimated End: **6**

1	2	3	4	5	6	7	8	9
Applied Research			Development			Demo & Test		

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For more information and an accessible alternative, please visit:
https://techport.nasa.gov/view/90442

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Images

Briefing Chart Image
Anomaly Detection to Improve
Airspace Safety and Efficiency,
Phase II
*(https://techport.nasa.gov/imag
e/135780)*

Technology Areas

Primary:

- TX11 Software, Modeling,
  Simulation, and Information
  Processing
  └ TX11.4 Information
    Processing
    └ TX11.4.2 Intelligent
      Data Understanding

Target Destinations

The Sun, Earth, The Moon,
Mars, Others Inside the Solar
System, Outside the Solar
System